

## Case Report

# Rainwater tank drowning

Roger W. Byard MD (Professor) \*

*Discipline of Pathology, The University of Adelaide, Level 3, Frome Road, Medical School North Building, Adelaide 5005, South Australia, Australia*

Received 7 May 2008; accepted 18 May 2008

Available online 9 August 2008

## Abstract

Drowning remains a significant cause of accidental death in young children. The site of drowning varies among communities and is influenced by cultural and geographic factors, including the availability of particular water sources. The drowning deaths of a twin two-year-old brother and sister in a rainwater tank are reported to demonstrate specific issues that may arise. Ladders, vegetation and trellises may provide access to tanks and should be removed. Secure child-proof access points should also be installed, particularly on in-ground tanks (given the ready accessibility of the latter). As there has been a recent trend in Australia to install more domestic rainwater tanks, the number of childhood rainwater tank drownings and near-drownings will need to be monitored by forensic pathologists and child death review committees to ensure that this has not led to the introduction of a new hazard into the home environment.

© 2008 Elsevier Ltd and FFLM. All rights reserved.

**Keywords:** Childhood drowning; Rainwater tank; Fresh water

## 1. Introduction

Australia, along with a number of other areas of the world, is currently experiencing a significant drought that has resulted in water restrictions being introduced in many areas. A number of strategies have been proposed by both governmental and nongovernmental organisations to help deal with the serious depletion of water reserves, one of which is encouragement of domestic rainwater tank installations in both rural and urban locations.<sup>1–3</sup> While guidelines have been provided to ensure optimum quality of stored water,<sup>2</sup> less emphasis has been placed on the potential for increased risks of drowning in the young. The following cases are reported to demonstrate hazards that may exist with already installed tanks and to explore possible issues that may arise with the current trend for increased installations.

## 2. Case reports

Two twin children, a boy and a girl aged two-years, went missing from the house that they were visiting. They were

found a short time later floating inside an old rainwater tank. There were no significant medical histories. At autopsy the children were both well nourished and normally formed. There were no underlying organic diseases present that could have caused or contributed to death and the only injuries noted were minor abrasions and bruises in the girl consistent with the scene findings and removal from the tank. Toxicological analyses were negative. Their deaths were attributed to fresh water drowning. Reconstruction of events by attending police revealed that the twins had gained access to the top of the tank by climbing a ladder that had been leaning against it. The cover of the tank had not supported their weights resulting in them falling into the water which measured approximately 1.5 m in depth.

## 3. Discussion

Young children are known to be at increased risk of drowning for a variety of reasons including their insatiable curiosity, enjoyment of exploration of seemingly unlikely environments, lack of appreciation of dangers, and relative physical weakness. These factors may have a compounding effect when young children leave supervised environments

\* Tel.: +618 8303 5441; fax: +618 8303 4408.

E-mail address: [byard.roger@saugov.sa.gov.au](mailto:byard.roger@saugov.sa.gov.au)

to investigate situations where there may be bodies or collections of water that they may fall or climb into.<sup>4</sup> Playing with toys in water may precipitate falls and immersion, and higher centres of gravity and poor coordination may be further contributing factors, along with a usual inability to swim. Minimal struggling and failure to call out for help are also factors that may contribute to lethal outcomes.<sup>4</sup> It also does not take much time for young children to get into serious difficulties, with studies showing that children who drown in swimming pools have often been unsupervised for less than five minutes.<sup>5</sup>

The reported cases demonstrate a number of these points with the two victims leaving a house unnoticed to explore the yard. A ladder left against an old rainwater tank provided access to the top of the tank that then gave way beneath them. Their immature coordination, small size and limited strength prevented escape. It is also possible that similar events could occur in more recently installed tanks if access covers are not robust and adequately secured. This applies particularly for in-ground tanks; in fact there was a report at around the same time as the described cases of a three-year-old boy in Queensland, Australia, who drowned after falling through the access cover of an underground tank at a farm.<sup>6</sup>

Children under four years of age are at particular risk of drowning that most often occurs in swimming pools, ponds, rivers and waterways and bathtubs. Swimming pool deaths have resulted in legislation for child-proof pool fencing being successfully introduced with subsequent falls in the rates of outdoor drowning.<sup>7,8</sup> Recently two separate incidents of toddlers drowning in a river were reported from South Australia associated with the use of highly mobile three-wheel strollers that had rolled away from carers into a watercourse.<sup>9</sup> Bathtub drownings continue to occur<sup>7,10</sup> and have been associated with the use of flotation or seating devices and the presence of an older sibling in the bath.<sup>11,12</sup> On occasion an underlying medical illness may either precipitate a fall into water or may cause drowning in a child who is already in water.<sup>13</sup>

The most common sites of childhood drowning also vary among communities and reflect the availability of water sources with, for example, more saltwater drowning in Denmark compared to bathtub deaths in Japan, and drowning in irrigation ditches in New Mexico.<sup>14</sup> As rainwater tanks are now becoming more common in Australia, and possibly in other parts of the world, it is possible that this increased availability may be associated with a rise in the rate of childhood tank drowning. Given that there has been active encouragement of rainwater tank installation in Australia perhaps it is timely to highlight the potential dangers of this trend for young children. Close

supervision of young children is required at all times when they are around or near water. Ladders and other access points (including trees, shrubs, timber and trellises) should not be left next to rainwater tanks and secure child-proof lids should be installed, particularly on in-ground tanks (given the ready accessibility of the latter). As was demonstrated in the reported cases these precautions also apply to houses that children may be visiting. Some manufactures are providing child-proof inserts to be fitted under access covers. Careful monitoring of the number of childhood rainwater tank drownings will be needed to ensure that a significant hazard is not being introduced into the domestic environment.

### Acknowledgement

We would like to thank the South Australian State Coroner, Mr. M. Johns, for permission to publish selected details of these cases.

### References

1. <http://www.standards.org.au/cat.asp?catid=41&contentid=214&News+1> (accessioned 15/02/2008).
2. Guidance on Use of Rainwater Tanks. enHEALTH, Australian Government Department of Health and Aging, 3432(JN8304), 2004 (<http://enhealth.nph.gov.au/>).
3. <http://www.arid.asn.au/> (accessioned 15/02/2008).
4. Byard RW, Lipsett J. Drowning deaths in toddlers and preambulatory children in South Australia. *Am J Forensic Med Pathol* 1999;**20**:328–32.
5. O'Flaherty JE, Pirie PL. Prevention of pediatric drowning and near-drowning: a survey of members of the American academy of pediatrics. *Pediatrics* 1997;**99**:169–74.
6. 'Two children drown at Easter gatherings' ABC News 15/4/2006 [Hhttp://www.abc.net.au/news/stories/2006/04/15/1616573.htm](http://www.abc.net.au/news/stories/2006/04/15/1616573.htm) (accessioned 15/2/02008).
7. Cass DT, Ross F, Lam LT. Childhood drowning in New South Wales 1990–1995: a population-based study. *Med J Aust* 1996;**165**:610–2.
8. Injury Deaths, Australia 1990–1994. Case numbers and rates per 100,000 population by year of death registration, age and sex. Adelaide: National Injury Surveillance Unit, 1996.
9. Byard RW, Matthews N. Drowning and three wheel strollers (letter). *Med J Aust* 2007;**187**:597–8.
10. Somers GR, Chiasson DA, Smith CR. Pediatric drowning: a 20-year review of autopsied cases: III. Bathtub drownings. *Am J Forensic Med Pathol* 2006;**27**:113–6.
11. Byard RW, Donald T. Infant bath seats, drowning and near-drowning. *J Paediatr Child Health* 2004;**40**:305–7.
12. Byard RW, de Koning C, Blackbourne B, Nadeau JM, Krous HF. Shared bathing and drowning in infants and young children. *J Paediatr Child Health* 2001;**37**:542–4.
13. Smith NM, Byard RW, Bourne AJ. Death during immersion in water in childhood. *Am J Forensic Med Pathol* 1991;**12**:219–21.
14. Somers GR, Chiasson DA, Smith CR. Pediatric drowning: a 20-year review of autopsied cases: I. Demographic features. *Am J Forensic Med Pathol* 2005;**26**:316–9.